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**Floodplain Development Pressures and Federal Programs
Part I: Case Study Analysis and Recommendations for the
'201' Wastewater Treatment Works Program**

Research Group, Inc., Atlanta, GA

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Floodplain Development Pressures and Federal Programs,

Part 1: Case Study Analysis and Recommendations for The "201" Wastewater Treatment Works Program

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Two additional volumes were prepared in support of this report. Part II identifies methods presently used by federal programs to mitigate floodplain impacts and presents a detailed analysis of decision points for floodplain impact mitigation in the '201' Wastewater Treatment Works Program. It is titled 'Floodplain Development Pressures and Federal Programs, Part II: Methods Used by Federal Programs to Reduce Floodplain Development Pressures.' Part III describes the location and major findings from each of the thirty-one case studies of floodplain development pressures. It is titled 'Floodplain Development Pressures and Federal Programs, Part III: Case Study Reports.'

This document and the two documents noted above are available to the public through the National Technical Information Service, Springfield, Virginia 22161.

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16. ABSTRACT The individual and combined effects of federal programs on development in floodplains are identified. Based on those findings, ways in which the '201' Wastewater Treatment Works Program of the U.S. Environmental Protection Agency can reduce floodplain development pressures are recommended. Major tasks in developing those recommendations: (1) Thirty-one case studies of the impact of federal programs on floodplain development were completed in the Southeast, West, and Midwest regions. Interviews with planning directors and other knowledgeable persons at the local government level provided the basic information; (2) Meetings with the EPA Regional Offices in Atlanta, Kansas City and Denver were held to review present methods for implementing floodplain policy related to '201' wastewater treatment facilities; (3) Federal programs which potentially can affect floodplain development were reviewed to identify the range of methods and approaches presently used to mitigate floodplain development pressures; and (4) Major decision points in the '201' Wastewater Treatment Works Program which can affect floodplain impacts were identified, based on a review of program regulations and guidance materials.		14. SPONSORING AGENCY CODE EPA/100/02	
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FLOODPLAIN DEVELOPMENT PRESSURES AND FEDERAL PROGRAMS,
PART I: CASE STUDY ANALYSIS AND RECOMMENDATIONS FOR THE
'201' WASTEWATER TREATMENT WORKS PROGRAM

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EXECUTIVE SUMMARY

FLOODPLAIN DEVELOPMENT PRESSURES AND FEDERAL PROGRAMS SUMMARY OF FINDINGS AND RECOMMENDATIONS

Between October, 1977 and June, 1978, a study of floodplain development pressures and federal programs has been carried out at the request of the Office of Federal Activities of the U.S. Environmental Protection Agency. The study recommends ways in which EPA can reduce floodplain development pressures caused by the '201' Wastewater Treatment Works Program.

The following information was collected and researched in order to recommend appropriate approaches to EPA:

1. Thirty-one case studies of floodplain development pressures in the Midwest, West, and Southeast regions were conducted. The degree to which certain federal programs have affected floodplain development was assessed in the case studies.
2. Meetings with EPA Regional Offices in Atlanta, Kansas City, and Denver were held to review present methods and approaches for mitigating floodplain development pressures caused by '201' wastewater treatment facilities. Contacts with Regional Offices of the Federal Insurance Administration were also made.
3. Interviews with federal officials were conducted and federal program regulations reviewed to identify methods presently being used by federal agencies.
4. Major decision points in the '201' Wastewater Treatment Works Program which can affect floodplain development were identified.

The findings from the research and recommendations for the '201' Wastewater Treatment Works Program are presented in a three-volume report. Major findings and recommendations from the study are summarized below.

Federal Programs and Floodplain Development:

1. Three federal programs were observed to encourage or allow urban development to take place. These programs include:
 - . '201' Wastewater Treatment Works Program - U.S. Environmental Protection Agency;
 - . Federal-Aid Highway Program - U.S. Department of Transportation; and
 - . Public Works Program (levee and dam construction) - U.S. Army Corps of Engineers.

In some cases, the urban development which was facilitated occurred in floodplain locations. In other cases, federal programs caused general community development.

2. The highest incidence of community development pressures came from the '201' Wastewater Treatment Works Program which was observed by persons interviewed to allow or encourage development in approximately 2/3 of the cases. In 16 out of 31 cases, the '201' Program allowed development to occur. In only 6 out of 31 cases, the program had the effect of encouraging development throughout the community.
3. Federal programs were not the major stimulus of floodplain development in most cases. Most federal programs had been obtained by local communities to improve community life for persons already living in the area.
4. No federal programs were noted as having encouraged development in the floodplain, although several were found to allow development in the floodplain to occur. This finding reflects the fact that many case study communities receiving '201' Wastewater Treatment Facility grants did not have development in the floodplain.
5. Two federal programs were found to discourage floodplain development. These programs include the National Flood Insurance Program of the U.S. Department of Housing and Urban Development and the Land and Water Conservation Fund Program of the Heritage Conservation and Recreation Service.

Present Approaches to the Reduction of Floodplain Development Pressures:

1. Floodplain development impacts caused by waste-water treatment facilities are usually identified by EPA Regional Offices when environmental reviews are completed. An environmental review is usually conducted after the Step 1 Facility Plan has been prepared.
2. Major floodplain development questions and issues have arisen for only a small number of '201' Waste-water Treatment Facility projects. When issues do arise, discussions and coordination with the Federal Insurance Administration often occurs. Formal procedures for FIA and EPA coordination have not been developed, however.
3. Grant conditions which restrict hookups in floodplains are sometimes used by EPA Regional Offices as a method for reducing floodplain development impacts. EPA Regional Office staff question, however, whether the grant conditions can be enforced after final payment on the '201' grant has been made. Other approaches such as the redesign of the facility are also used, although they frequently result in some project delays. Delays occur because the floodplain development issue is not identified until after the Step 1 Facility Plan has been completed.

Methods Used by Federal Programs to Control Floodplain Development:

1. Approaches used by federal programs to identify and mitigate floodplain development pressures may be organized into three categories:
 - . Regulation of land uses in the floodplain, either by state, federal, or local agencies;
 - . Policies concerning floodplain development, including design standards for flood hazard protection, location criteria, and natural resource protection policies; and
 - . Environmental impact assessments carried out during the project planning process in com-

pliance with the National Environmental Policy Act (NEPA).

The use of environmental impact assessment procedures is the predominant method used by federal programs. The review of federal programs was completed during the Fall of 1977, prior to the implementation of the Floodplain Management Executive Order. It is expected that NEPA procedures together with new "floodplain impact notice" procedures will be the dominant federal approaches in the future.

2. Although several federal programs require the development and implementation of regulatory programs for the control of land and water uses, the National Flood Insurance Program is the only program providing incentives for the regulation of the entire floodplain. Although the focus of the National Flood Insurance Program is flood hazard protection, the program often discourages floodplain development. This fact is documented in several of the floodplain development case studies.
3. Three federal agencies, including the Federal Highway Administration, the Environmental Protection Agency, and the Farmers Home Administration have developed specific policies relating to the location of facilities and structures in floodplains. In each case, the policies direct facilities to locations outside of floodplains, whenever possible.
4. The U.S. Environmental Protection Agency is the only federal agency with specific policies on secondary impacts (Program Guidance Memorandum #59, titled "Consideration of Secondary Environmental Effects in the Construction Grants Process"). The policy statement directs EPA administrators and agencies receiving '201' grants to fully consider secondary impacts during the environmental impact assessment process. Agencies are encouraged to mitigate secondary impacts by phasing sewer service, revising projects, and restricting treatment facility use after construction.

5. All agencies contacted for this study complete environmental assessments of proposed actions in compliance with the National Environmental Policy Act. The degree to which floodplain impacts are identified and assessed varies among federal agencies and also varies among specific projects considered by each agency.

Decision Points in the '201' Wastewater Treatment Works Program
Related to Floodplain Development Impacts:

1. The '201' Wastewater Treatment Works Program is organized into three stages, called steps. During Step 1, the grantee prepares a Facility Plan which reviews alternative approaches to wastewater treatment facility needs and recommends an approach. During Step 2, detailed engineering designs are prepared. During Step 3, facility construction takes place. EPA review and approval takes place prior to each step. Separate grants are made for planning, design, and construction activities.
2. Important decisions are made by EPA prior to the Step 1 grant. The review and approval of the "priority list" of projects for funding which is prepared by state agencies is of special note.
3. Several types of decisions, made at different points in the '201' process, can affect the impact of a facility on floodplain development. As indicated below, according to EPA regulations and guidelines, the Step 1 facility planning process is the proper time to identify floodplain development impacts and alternative approaches for reducing and mitigating impacts. The types of decisions and their relationship to the '201' process are as follows:
 - Decisions related to the location of the facility: Because development often occurs around a treatment plant and interceptor, even when service to the area is not anticipated, decisions related to the location of wastewater treatment facilities can influence floodplain development impacts.

Considerations related to the location of the facility occur prior to the approval of a Step 1 grant, when the preliminary project boundary for the Facility Plan is identified. The specific location for the facility is determined during Step 1 facilities planning.

. Decisions related to the size, capacity, and service area of the facility: Decisions related to the physical capacity and size of the treatment facility, as well as the area serviced, affect growth and development. Most '201' projects provide for growth which is projected to occur over a 20 year period.

Detailed planning for the size, capacity, and service area of the facility takes place during Step 1. When the Step 1 Facility Plan is reviewed by the EPA Regional Office, further consideration is given to the proposed size, capacity, and service area.

. Decisions related to facility staging and hookup: After the existing and projected population to be served has been determined, the staging of construction and hookup provisions can be determined. Such policy decisions can provide for the limitation of development in floodplains.

Decisions related to staging of the facility and hookups also should occur during the Step 1 facility planning process. The Step 1 Facility Plan must identify ways to mitigate environmental impacts related to the facility. When the EPA Regional Office considers the Step 1 Facility Plan, proposals for facility staging and restrictions of hookups are also considered.

Recommendations for Reducing Floodplain Development Pressures
Resulting from '201' Wastewater Treatment Facilities:

1. Identification of Floodplain Development Pressures
and the '201' Program Planning Process:

Although floodplain development pressures should be identified and considered during Step 1 facility planning, this identification typically does not occur. Instead, EPA Regional Office staff identify issues during the environmental review which occurs after the Step 1 Facility Plan has been completed.

In order to encourage and facilitate a thorough review of floodplain development pressures during the Step 1 stage, it is recommended that EPA Regional Offices identify those facility projects which are likely to create development pressures prior to the Step 1 grant. This identification can be carried out from the state project priority lists without extensive study. Project boundaries should be compared with general floodplain boundary information available through the Federal Insurance Administration and through contacts with Federal Insurance Administration staff who are familiar with floodplain development in many communities in their region.

2. Coordination Between the U.S. Environmental Protection Agency and the Federal Insurance Administration:

The Federal Insurance Administration, through the National Flood Insurance Program, is devoting significant resources to floodplain information and management concerns. The FIA Regional Offices are willing and interested in providing assistance and information to EPA Regional Offices on a request basis.

It is recommended that more extensive information exchange and coordination between FIA and EPA occur in the future. EPA staff should be provided with information about floodplain hazards, development issues, and the National Flood Insurance Program. FIA should be informed about EPA policies concerning floodplain development.

In order to facilitate the communication and organization of appropriate meetings and workshops, it is recommended that a floodplain coordinator be designated in each EPA Regional Office. The designated coordinator would initiate appropriate meetings and seminars, monitor the implementation of floodplain policy within each EPA Regional Office, and could complete the floodplain impact reviews recommended previously.

3. Federal Agency Coordination for Floodplain Impact Mitigation:

Although there is no typical sequence or pattern in which federal programs occur in local communities, federal agency coordination in specific cases is recommended. Coordination should occur when two federal agencies are considering projects which may affect the same floodplain area. In such cases, it is essential that the agencies have similar policies and approaches.

The problem faced by EPA Regional Offices in implementing this recommendation is the identification of other federal programs. Such an identification could be requested through the Step 1 Facility Plan and considered by EPA Regional Offices when the Step 1 Facility Plan is submitted for review. The coordination with other federal agencies should take place as early as possible in the planning process.

4. Use of Grant Conditions for Sewer Hookup Restrictions:

The use of grant conditions for sewer hookup restrictions is one of several floodplain development mitigation measures available to the U.S. Environmental Protection Agency. Grant conditions are most useful when floodplain development pressures are discovered after the Step 1 Facility Plan has been completed. Typically, this is the case with the '201' Program.

The EPA Office of General Counsel has determined that grant conditions on Step 2 and Step 3 grants do extend beyond the payment period and can be enforced through court action. It is, therefore, recommended that EPA Regional Offices be informed of the utility and enforceability of grant conditions and be encouraged to use this approach, in addition to other mitigation measures.

5. Definition of Criteria and Standards for Floodplain Development Impacts:

In some cases, floodplain development pressures cannot be avoided. In such cases, it may be possible to reduce hazardous conditions and development impacts if certain steps are taken. It is important that each EPA Regional Office develop appropriate criteria and standards related to floodplain development for use in such cases. It is recommended that each EPA Regional Office monitor EPA decisions on floodplain development impacts and work closely with FIA Regional Offices in the development of such criteria and standards.

CHAPTER ONE

AN INTRODUCTION TO FLOODPLAIN DEVELOPMENT IMPACTS RELATED TO WASTEWATER TREATMENT FACILITIES

A. Introduction

Urban development in floodplains can create numerous environmental and safety problems. Development in floodplains is frequently subject to hazardous flood conditions which endanger lives as well as property. Floodplain development can damage sensitive environmental resources such as wetlands and can also increase flood heights and hazards downstream.

It is the policy of the U.S. Environmental Protection Agency to avoid the construction of wastewater treatment facilities in floodplains whenever possible. Due to engineering and cost reasons, however, treatment plants and interceptors are often located in floodplains. When interceptors pass through undeveloped floodplain lands, the presence of sewage treatment facilities can be an incentive for further floodplain development.

Flood impacts can, therefore, be classified into two categories: (1) primary impacts, and (2) secondary impacts. Primary impacts are changes which directly result from the construction and operation of a facility. For example, a sewer interceptor may destroy an archaeological site or raise the level of downstream flood waters.

In contrast, secondary impacts are indirect or induced changes. Land use development stimulated by facility construction is a major secondary impact which is of environmental concern. Secondary impacts, although more difficult to identify or predict, often create more environmental damage than primary impacts from the construction of a treatment plant. The potential for secondary development impacts from wastewater treatment facilities is a continuing concern of the U.S. Environmental Protection Agency and is the focus of this study.

The identification and reduction of floodplain development pressures from federal programs is an inter-agency task. If the actions of one agency promote floodplain development while other agencies are trying to reduce floodplain development pressures, uniform federal policy cannot be achieved.

The U.S. Environmental Protection Agency presently has in effect a series of regulations and guidelines pertaining to the identification and mitigation of environmental impacts, including secondary development caused by wastewater treatment facilities and need for floodplain protection. The policies of EPA have been reinforced by the May, 1977 Executive Order on Floodplain Management issued by President Carter which clearly states that federal programs should avoid floodplain development impacts. Agencies in Washington, D.C. are presently working together to identify and implement uniform guidelines in response to the Executive Order.

There is, however, a continuing need to examine the impacts of federal programs and projects on floodplain development, and a continuing need to explore new ways of mitigating adverse impacts. Mitigation measures may include new administrative techniques or legal approaches, as well as new applications of existing techniques. In some cases, two or more agencies can work together and save each agency time and effort.

B. Purpose of the Study

The purpose of this study is to identify the individual and combined effect of federal programs on development in the floodplain and to recommend ways in which the '201' Wastewater Treatment Works Program of the U.S. Environmental Protection Agency can reduce floodplain development pressures.

The following research was completed as background for recommendations to the '201' Wastewater Treatment Works Program:

1. Thirty-one case studies of the impact of federal programs on floodplain development were completed in the Southeast, West, and Midwest regions. Interviews with planning directors and other knowledgeable persons at the local government level provided the basic information;

2. Meetings with the EPA Regional Offices in Atlanta, Kansas City, and Denver were held to review present methods for implementing floodplain policy related to '201' wastewater treatment facilities;
3. Federal programs which potentially can affect floodplain development were reviewed to identify the range of methods and approaches presently used to mitigate floodplain development pressures; and
4. Major decision points in the '201' Wastewater Treatment Works Program which can affect floodplain impacts were identified, based upon a review of program regulations and guidance materials.

The findings from the case studies, the results of the EPA regional office meetings, and recommendations for the '201' Wastewater Treatment Works Program are presented in Part I of this three-volume report.

Two additional reports present detailed information and analysis from the study. Part II identifies methods presently used by federal programs to mitigate floodplain impacts and presents a detailed analysis of decision points in the '201' Wastewater Treatment Works Program. Part III describes the location and major findings from each case study of floodplain development pressures.

As an introduction to the findings and recommendations on floodplain development impacts and the '201' Wastewater Treatment Works Program, the following topics are reviewed in this chapter:

- . Definition and importance of the floodplain;
- . President Carter's Floodplain Management Executive Order; and
- . Previous studies related to wastewater treatment facilities and secondary development.

Chapter Two of this report documents the methods and findings from the community case studies and from EPA Regional Office meetings. Chapter Three presents the recommendations for the '201' Wastewater Treatment Works Program.

C. Definition and Importance of the Floodplain

Floodplains are lowland areas adjacent to rivers, streams, ponds, and oceans which are subject to periodic inundation. The natural function of the floodplain is to hold and retain excess amounts of water during times of river or tidal floods.

Most rivers overflow their banks every one and one-half to two years, although the most severe floods occur at less frequent intervals. The 100-year flood, a flood which has a one percent possibility of occurring in any given year, is the floodplain definition used in implementating the National Flood Insurance program administered by the U.S. Department of Housing and Urban Development. For purposes of this study, the floodplain has been considered as equivalent to the 100-year floodplain.

When urban development takes place in the floodplain, inconvenience, hardship, danger, and both environmental and economic losses may result. Flood waters take a high toll on developed property each year, and in severe storms can endanger lives as well as property.

Construction in the floodplain reduces the vegetative cover which slows the force of the waters. The vegetation of the floodplain also absorbs sediments and pollutants from upstream areas. The natural value of floodplains is reduced when certain types of floodplain development occurs.

Biologically productive wetlands are often an intrinsic part of the floodplain. Wetland areas are characterized by saturated soils, and are usually the lowest lying areas of the floodplain, found close to the stream channel. As a result of natural nutrient cycles and the periodic exchange of materials between the river (or estuary) and the wetland area, wetlands are an important habitat for fish and wildlife. The decayed organic matter carried by the flood waters to the river is an important source of nutrients for fish and wildlife as well.

Problems associated with flooding often increase as the floodplain becomes more urbanized. As development occurs, the area where the water can soak into the ground is decreased, and runoff of water from nonporous surfaces increases. The increased runoff may create greater flooding problems downstream, as well as downstream pollution problems.

When development occurs in the floodplain, special construction standards, such as the elevation of the ground floor of a building, may be necessary in order for the property owner to be eligible for National Flood Insurance. The building requirements are designed to protect property against flood damage, safety, and the public cost of flood disaster relief. Other land management standards developed and implemented by federal, state and local governments may direct development to certain portions of the floodplain (or direct development outside of the floodplain) and provide protection for sensitive environmental areas.

Despite the basic definition and values of the natural floodplain described above, floodplain characteristics vary widely across the country. Certain floodplains are wet at all times; other floodplains are dry areas adjacent to intermittent streams. Flooding hazard, in turn, widely varies and reflects many different natural forces. Environmental resources in floodplains and their relative importance are also varied.

The diversity in types of floodplains as well as different community floodplain development histories and needs makes the development of specific standards and criteria for floodplain development extremely difficult. This is one of the basic challenges of floodplain impact assessment and floodplain management, and is a task that requires the full involvement of federal, state and local officials.

D. President Carter's Floodplain Management Executive Order

In May, 1977, President Carter issued Executive Order 11988, titled "Floodplain Management," which sets forth a new policy and federal role in floodplain protection. In effect, the Order calls attention to floodplain protection needs and specifies a floodplain impact identification process for use by federal agencies. As stated in the Executive Order, the provisions give additional support for implementation of the National Environmental Policy Act of 1968, the National Flood Insurance Act of 1968, and the Flood Disaster Protection Act of 1973.

Under the Executive Order, agencies are mandated to "avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid the direct and indirect support of floodplain development, whenever there is a practicable alternative." The Order applies to all federal agencies which acquire, manage, or dispose of federal lands and facilities; agencies which undertake, finance, or assist construction and improvements; and agencies which conduct activities and programs affecting land use, including planning, regulation, and licensing activities.

The Executive Order on Floodplain Management cites specific requirements for federal agency compliance:

- . An agency must first determine whether the proposed federal action will occur in the floodplain;
- . If the action is to occur in the floodplain, the agency should study alternatives to avoid adverse effects in the floodplain; and
- . If no practicable alternative is found, the agency must take steps to minimize the potential harm to lives and property as well as to protect the natural values of the floodplain.

Specific standards for minimizing harm are not included in the Executive Order; agency procedures will be used to spell this out for specific programs and activities. If floodplain siting is the only practicable alternative, the agency must prepare and circulate a notice explaining why the action is proposed to be located in the floodplain.

Federal agencies are in the process of issuing or amending existing regulations in order to define the means to be used to encourage nonhazardous use of floodplains. The Federal Insurance Administration of the U.S. Department of Housing and Urban Development, the U.S. Water Resources Council, and the Council on Environmental Quality are coordinating implementation of the Order and the provision of assistance to federal agencies. The U.S. Environmental Protection Agency will consider the findings from this study when determining their approach to the Floodplain Management Executive Order.

E. Previous Studies: Wastewater Treatment Facilities and Secondary Impacts

Three studies relating to wastewater treatment facilities and secondary development impacts are reviewed here as background to the findings from the present study.

The first study, "Interceptor Sewers and Suburban Sprawl: The Impact of Construction Grants on Residential Land Use", was completed for the Council on Environmental Quality in 1974. Although the study is four years old and although program administration approaches used by the U.S. Environmental Protection Agency have evolved since that time, the study documents useful case studies and information related to secondary development impacts of interceptor sewers.

The second study, titled "Mitigating Secondary Impacts from the Wastewater Facilities Program" was prepared by the Office of Land Use Coordination, U.S. Environmental Protection Agency, in January, 1977. The study documents approaches used in seven communities to mitigate secondary impacts from facility construction.

The third study is the October, 1976 - March 1977 review and evaluation of '201' wastewater treatment facility grant program documents completed by the National Wildlife Federation. The report summarizes findings from a review of over 500 negative declarations, environmental appraisals, and environmental impact statements from various EPA regional offices.

Major findings from each of these studies are summarized below as background for the analysis of the floodplain development pressures case studies recently conducted. The present research builds upon these previously completed studies.

1. Interceptor Sewers and Suburban Sprawl

"Interceptor Sewers and Suburban Sprawl: The Impact of Construction Grants on Residential Land Use" was prepared for the Council on Environmental Quality by Urban Systems Research and Engineering in 1974. The basic objective was to determine the effect of EPA funded projects on residential development patterns in rapidly growing communities. That output has implications for floodplain management. If interceptor sewers have a significant effect on residential development patterns, it is likely that they also can affect development in floodplains if EPA and local governments do not restrain floodplain development through other mechanisms.

Two sources of information were analyzed. First, population design characteristics and flow characteristics of 52 selected interceptor sewer projects were analyzed. Excess capacity and possible land use impacts of each project were reviewed. In order to identify further land use implications of the EPA projects, a selected sample of eight local projects with particularly high excess capacity and a large proportion of vacant developable land were examined in detail. The case studies identified the way in which land use and related planning considerations entered in the design, review and approval process of the U.S. Environmental Protection Agency.

The major findings of the study are as follows:¹

¹ Urban Systems Research and Engineering, "Interceptor Sewers and Suburban Sprawl: The Impact of Construction Grants and Residential Land Use," Volume I, prepared for the Council on Environmental Quality, Washington, D.C., 1974, pp. 2-30.

1. Since housing patterns are a result of a complex set of historical, economic, social and political interactions, interceptor sewer construction must be considered as only a contributing rather than a decisive factor in shaping future residential land use.
2. Nevertheless, the building of interceptors is an incentive to development, and the routing, sizing and timing of new interceptor construction can be a valuable tool for guiding residential land use. In order for this to become effective, however, land use and sewer planning must be more carefully coordinated.
3. If the federal government wishes to encourage careful land use planning and control at the local level, it can begin by evaluating the extent to which the current design and approval process for federally-financed interceptors takes into account land use implications.
4. Interceptor sewers are often sized with tremendous excess capacity and designed to serve the ultimate, highest density population anticipated for large service areas now containing large tracts of vacant, developable land.
5. Based upon eight detailed case studies, there is little evidence that local planning and review processes include a careful assessment of the potential adverse secondary impacts of interceptor construction.
6. Financing procedures at both the local and federal level may encourage the construction of sewerage systems tailored to the needs of future developers rather than the control of pollution problems.

Reflecting the findings, study recommendations emphasize the need to finance only project costs needed for sewer capacity for the existing population, the staging of project design in rapidly growing areas, the use of realistic standards for per capita flow, improved population forecasting techniques and procedures, and the consideration of environmental effects of land use induced by the interceptor sewer.

Since 1974 when the study was published, numerous policy and program changes have taken place in the '201' Wastewater Treatment Works Program. All '201' Facility Plans are required to consider the secondary as well as primary impacts of the facilities. By providing facilities to serve only a 20-year projected population growth, EPA reduces the potential impacts of wastewater treatment projects. In some cases, the projected population for the facility is less than 20 years.

2. Mitigating Secondary Impacts from the Wastewater Facilities Program

In 1977, the EPA Office of Land Use Coordination compiled a case study analysis of measures actually used to mitigate secondary impacts from the '201' Wastewater Treatment Works Program. The study was undertaken in response to the charge that new regional sewage facilities, in certain cases, were facilitating rapid population growth which results in adverse impacts on water quality, among other impacts.

The case studies were undertaken to identify successful mitigation measures which could be useful in different parts of the country. As a second purpose, the studies were undertaken to sharpen the focus of EPA policy concerning secondary impacts.

As identified by the study, the major secondary impacts from the '201' Wastewater Treatment Works Program result from the placement, sizing, and staging of interceptor sewers and the provision of reserve capacity in those sewers. Examples of secondary impacts include:²

- . Changes in the timing, density, type and location of development. The provision of public sewage capacity can affect many aspects of urban development especially when urban development is not possible without sewer facilities.
- . Changes in air, water, noise, solid waste or pesticide pollution stemming from the induced changes in population or land use. The induced changes may intensify the water pollution that the facility was designed to eliminate.

² Office of Land Use Coordination U.S. Environmental Protection Agency, "Mitigating Secondary Impacts from the Wastewater Facilities Program," Washington, D.C., 1975.

- . Damage to sensitive ecosystems, such as wetlands or wildlife habitats, or culturally important areas as a result of changes in population and land use.

In order to illustrate approaches used for mitigating secondary impacts, seven case studies were detailed.

Types of mitigating measures found in the case studies included the following:

- . Project re-design and revision;
- . Scaling down of original treatment project design to service a smaller area;
- . Grant conditioned on not accepting wastewater from new development in certain locations, or a certain number of hookups;
- . Grant conditioned on the completion of certain technical studies or plan preparation and implementation; and
- . Separate facilities for sub-areas built in phases in lieu of one large regional treatment plant with a long interceptor.

In all but two of the cases, the first significant point of EPA involvement in the land use issues occurred after the questions were raised as part of the Environmental Impact Statement process. In two of the cases, the concerns were first discussed with the applicant at pre-application conferences.

The case study of the Renner Sanitary District in South Dakota is of particular interest since it focuses on the secondary impacts of a collection sewer system on the Big Sioux River Floodplain, near Sioux Falls, South Dakota. In the review of the Step 1 Facility Plan, the question of the impact of sewer connections to serve new floodplain development (some lots had already been developed) was raised. Sewer service to the floodplain was necessary because groundwater contamination as a result of malfunctioning septic systems had been identified by the County Department of Health.

Through meetings between EPA and the Minnehaha County Planning and Zoning Commission, it was determined that EPA would condition Step II and III grants by prohibiting connections from any new dwelling within the 100-year floodplain. This policy reflected the policy of the County to prohibit new floodplain development.

Mitigating measures used to reduce impacts included (1) conditions on the Step II grant which required that no connections be allowed for future development within the 100-year floodplain, and (2) recommendations that the collection line be sized to serve existing residents plus a "moderate" amount of new growth.

3. National Wildlife Federation Evaluation

In April, 1977, the National Wildlife Federation published the third in a series of reviews of environmental documents from the '201' Wastewater Treatment Works Program of EPA.³ The research, funded by the Council on Environmental Quality, has provided for a documentation and assessment of EPA compliance with the 1966 Executive Order on Floodplain Management (Executive Order 11296) and an assessment of the degree to which secondary land use impacts are typically considered in environmental impact documents.

Through a Freedom of Information request, the National Wildlife Federation received declarations, appraisals, and environmental impact statements from EPA Regional Offices. When environmental appraisals indicated potential adverse environmental impacts, the study team investigated projects in further detail. Based upon a review of approximately 500 documents and numerous contacts with EPA personnel, state and federal agency officials, and private conservation groups, findings and recommendations for reducing the environmental impact of '201' wastewater treatment facilities were made.

³ Thomas K. Bick, "Third Interim Review of EPA 201 Wastewater Treatment Facility Grant Program Documents for Land Use Impacts, NEPA Compliance and Public Participation, October 1, 1977," National Wildlife Federation, Washington, D.C., April, 1977.

Major findings and recommendations of the study related to floodplains impacts and land use impacts are summarized below.

Floodplain impacts: Executive Order 11296 mandates the avoidance of the uneconomic, hazardous, or unnecessary use of floodplains. The major finding from the National Wildlife Federation's survey is that the '201' Program is still subsidizing urban development in flood hazard areas on a large scale. The study further found that floodplain impacts are not being adequately identified or mitigated by Regional Offices of the U.S. Environmental Protection Agency.

As noted in the report, communities often propose the construction of wastewater treatment facilities to serve new development in floodplains. In many cases, development already exists which requires sewerage. In other cases, developments are proposed in floodplains because of the availability of flat, open land. A third factor leading to floodplain development is the need to locate treatment facilities for cost and engineering reasons. Often treatment plants located in floodplains can take advantage of gravity flow of wastewater.

Out of 518 projects reviewed during the reporting period, at least 78, or approximately 13 percent of the projects, were found to accommodate or induce a significant amount of new floodplain development. This total does not include projects designed to serve existing floodplain development. Additional findings included the following:

- . Only one EPA Regional Office (Region IV in Atlanta) systematically contacts the Flood Insurance Administration to request that special floodplain rate maps be prepared when it has been determined that a '201' facility will accommodate floodplain growth.

- Although some regions occasionally mitigate floodplain impacts by requiring the relocation of interceptors and treatment plants to locations outside of floodplains, or by requiring that a sewer traversing a floodplain be a force main, such mitigation measures are rare.
- None of the documents reviewed disclosed the use of hookup restrictions in floodplains as grant conditions.

The National Wildlife Federation has recommended closer coordination between EPA and the Flood Insurance Administration of the U.S. Department of Housing and Urban Development in order to expedite the preparation of flood rate map preparation in communities where treatment facilities are being constructed in floodplains.

A second recommendation is that EPA should disclose all development located in floodplains which will be served by new '201' facilities as well as all development induced by the projects.

The final recommendation is the need for EPA Washington guidance and direction to ensure that floodplain development is not induced by '201' wastewater treatment facility projects. The use of hookup restrictions as grant conditions is recommended.

Land Use Impacts: The degree to which secondary land use impacts are being considered and mitigated by EPA was an additional point of review. Major findings from the review of '201' Program documents and contacts with officials and observers include:

- Secondary land use impacts of '201' facilities are not being adequately disclosed in environmental declarations and appraisals. Most of the environmental assessments reviewed also failed to adequately discuss land use impacts.
- EPA project reviewers often felt incapable of thoroughly assessing land use impacts due to lack of available information, lack of expertise, or lack of time.

- . Interceptors are regularly designed for 50 year population projections and treatment plants are designed for 20 year population projections.
- . The staging of facility projects in order to avoid induced growth was proposed in only a small percentage of the projects reviewed.
- . In locations where secondary land use impacts are expected, most EPA Regional Offices are reluctant to exercise their authority to control hookups in order to reduce the impacts.
- . Most EPA Regional Offices question their legal authority to restrict hookup or impose land use planning requirements. Regional Office personnel also feel that hookup restrictions are not practical, and believe that EPA cannot enforce such restrictions after the final construction grant payment has been made.
- . Most EPA Regional Offices feel that the mitigation of land use impacts from '201' facility projects is the sole responsibility of local planning agencies.

The National Wildlife Federation has recommended that the Washington Office of EPA provide more specific guidance to Regional Offices concerning the evaluation of secondary impacts. Additional information and regulations concerning grant conditions is also recommended. In response to the issue of facility sizing and staging, the National Wildlife Federation has recommended that interceptor sewers be sized to accommodate 25-year population projections, and that ten-year staging of facilities should be required when sewers serve areas which are less than 60 percent developed.

CHAPTER TWO

RESEARCH METHOD AND MAJOR FINDINGS

A. Introduction

The purpose of the research on floodplain development pressures undertaken for the Office of Federal Activities, U.S. Environmental Protection Agency, has been to document the impacts of federal programs in selected case study locations and to recommend program approaches to the '201' Wastewater Treatment Works Program, based upon the findings.

As a supplement to the case studies, meetings were held in three EPA Regional Offices to review current floodplain impact issues related to wastewater treatment facilities. Floodplain development pressures and impacts of federal programs were also discussed through telephone contacts with Regional Offices of the Federal Insurance Administration located in Denver, Kansas City, and Atlanta.

The assistance of local and federal officials interviewed is gratefully acknowledged. Although the findings and recommendations of this study are made by The Research Group, Inc., many valuable insights and information were obtained through case studies and other meetings.

This chapter is divided into several parts. First, the basic research method and approach to the case study interviews is presented. Second, the actual findings from the case studies are documented with appropriate summary tables. Finally, inter-agency aspects of floodplain management identified primarily through federal agency contacts are presented.

Case study descriptions are presented in Part III of this report. The interested reader is urged to review specific background information and federal program impacts from each case. Case study maps are presented to orient the reader to community features and federal programs in Part III.

B. Case Study Method

In order to document the impacts of federal programs on floodplain development, thirty-one case study locations were selected for detailed local agency interviews. Case study locations within the jurisdictions of the Atlanta, Kansas City, and Denver Regional Offices of EPA were selected. Detailed interviews with local planning directors and other officials provided the basic information.

Case study locations were selected in order to maximize the potential for obtaining information on wastewater treatment facility impacts. Due to the relatively small number of sites to be selected, a random sampling procedure was not used. Although the results from the case studies can not be generalized to all communities receiving wastewater treatment facilities, the information obtained has important implications for the implementation of floodplain development impact policies by the U.S. Environmental Protection Agency.

The following criteria were used to select case study locations:

- . Locations where a '201' Wastewater Treatment Works construction grant involving both a treatment plant and interceptor had been received;
- . Communities which received grants early in the 1970's, in order to maximize the potential of secondary development impacts; and
- . Communities which were located in or near different types of floodplains and which had different types of development pressures.

In order to maximize the diversity of the case studies, efforts were made to select locations with different economic, social, and physical characteristics. For example, in the Southeast, an effort was made to survey several communities in low-lying coastal areas, as well as areas in the rolling Piedmont area. In the Midwest, communities near major rivers as well as small streams were surveyed. In some cases, communities were entirely in the floodplain while in other cases, only a portion of the town was in the floodplain.

It was recognized that if a community was not experiencing growth and development, the construction of treatment facilities would probably not be found to be a contributor to growth. Therefore, it was hoped that small, no-growth rural communities could be avoided. It was found, however, that in order to meet the first two criteria listed above, a number of small communities needed to be included in the survey. Most large cities have not had initial wastewater treatment plant and interceptor construction through the '201' Program. As a result, the findings from the study concerning impacts of treatment facilities are conservative and understate potential impacts of treatment facilities. Case study locations are shown on Figures 1, 2, and 3.

Interviews with local planning directors and other officials were completed in each of the case study locations. During the meetings, the following questions were reviewed.

1. What are the boundaries of the 100-year floodplain near the '201' wastewater treatment facility?
2. Over what period of time has development in the floodplain occurred? When did most of the development occur? Is the floodplain completely developed at present?
3. What federal programs or projects (including planning and construction activities) have taken place in the selected floodplain?
4. When were the federal programs or projects initiated and completed?
5. To what extent have these federal programs and projects influenced development in the floodplain?

In cases where there was significant development in the floodplain, the floodplain area within the facility service area was used as the study area boundary. In cases where floodplain development was insignificant, the entire service area of the facility or the entire community was used.

FIGURE 1
CASE STUDY LOCATIONS - ATLANTA REGION

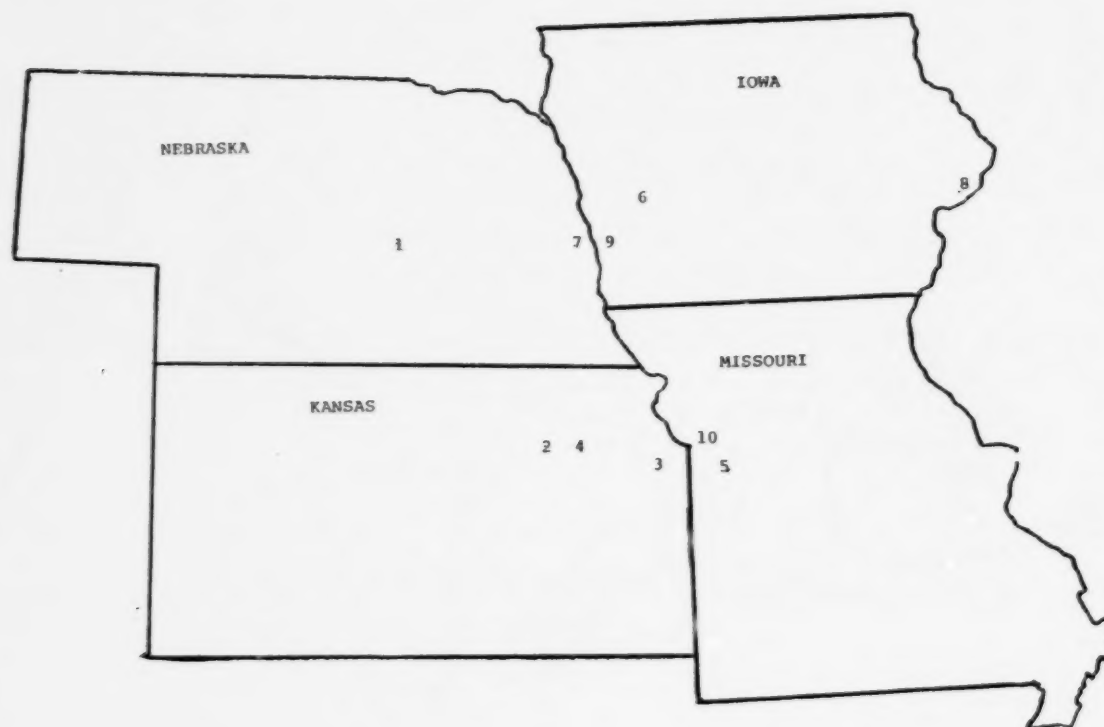


KEY:

- 1- Fulton County, Ga.
- 2- Macon and Bibb County, Ga.
- 3- Perry, Ga.
- 4- North Macon County, Ala.
- 5- North Myrtle Beach, S.C.

- 6- Sumter, S.C.
- 7- Columbia, S.C.
- 8- Batesburg and Leesville, S.C.
- 9- Tybee Island, Ga.
- 10- Buford and Sugar Hill, Ga.

FIGURE 2
CASE STUDY LOCATIONS - KANSAS CITY REGION



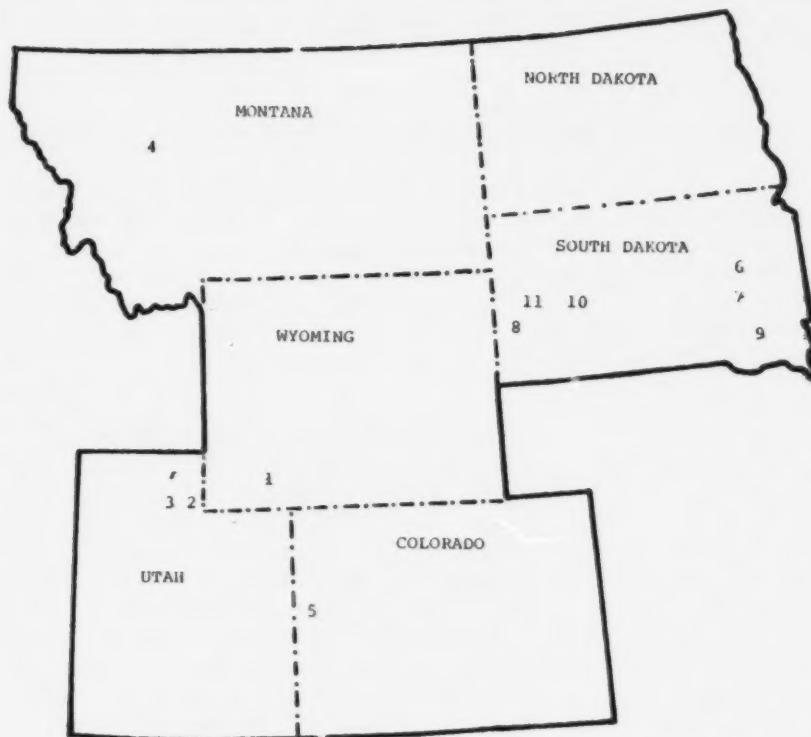
KEY:

- 1- York, Nebraska
- 2- Manhattan, Kansas
- 3- DeSoto, Kansas
- 4- Wamego, Kansas
- 5- Pleasant Hill, Missouri

- 6- Harlan, Iowa
- 7- Omaha, Nebraska
- 8- Davenport, Iowa
- 9- Council Bluffs, Iowa
- 10- North Kansas City, Missouri

FIGURE 3

CASE STUDY LOCATIONS - DENVER REGION



KEY:

- 1- Rock Springs, Wyoming
- 2- Hyrum, Utah
- 3- Wellsville, Utah
- 4- Missoula, Montana
- 5- Grand Junction, Colorado

- 6- DeSmet, South Dakota
- 7- Howard, South Dakota
- 8- Keystone, South Dakota
- 9- Monroe, South Dakota
- 10- Wasta, South Dakota
- 11- Rapid City, South Dakota

In all case studies, an effort was made to completely document the types of federal programs occurring and the effect of the federal programs on floodplain development. A detailed analysis of the causes of development pressures apart from federal programs was not made, although observations of planning directors were recorded. In order to insure that a wide range of federal programs was discussed, the list displayed on Figure 4 was used during the course of the interviews.

C. Federal Programs and Floodplain Development Impacts

The thirty-one case studies of local communities and floodplain development pressures document the timing of federal agency programs and activities and the relationship of federal programs to floodplain development. Figures 5 through 10 summarize the findings from the case studies in each of the three regions. Two figures pertain to each region where case studies were conducted, as follows:

Figures 5, 6, and 7: Locational characteristics of the case studies, including the type of community surveyed, the type of floodplain, the type of study area selected, and the use of the floodplain (such as development and open space uses). Figure 5 pertains to case studies in the Atlanta region, Figure 6 pertains to the Kansas City region, and Figure 7 pertains to the Denver region.

Figures 8, 9, and 10: Effect of selected Federal programs on floodplain development and community development. Figure 8 pertains to case studies in the Atlanta region, Figure 9 pertains to the Kansas City region, and Figure 10 pertains to the Denver region.

As documented on the "locational characteristics" charts, the communities surveyed reflect a wide variety of situations. Some communities were rapidly developing while others exhibited slow growth rates. In several cases, the question was not "how do federal programs affect development" but, rather, "how do federal programs assist communities in adjusting to population losses," reflecting the lack of urban development.

The types of floodplains found in the case study communities also were highly varied. In the Southeast, types of floodplains included intermittent streams, extensive bottomland hardwood swamps, smaller swamps, and low-lying coastal floodplains. In the Midwest, both major riverine floodplains and small creek floodplains were encountered. In the West, creek floodplains, high watertables, several intermittent streams, and one major riverine floodplain were included in the case study communities.

Although the diversity of floodplain types reflects the varying conditions in these three regions, the sample of case studies does not reflect the geographic distribution of types of floodplains. For example, extensive river swamp forests are found adjacent to many of the major rivers in the Southeast and represent important wetland and floodplain resources. Only one case study community...North Macon County, Alabama...has a floodplain which can be characterized as an extensive swamp.

A complete listing of the number of communities in the Southeast, West, and Midwest where significant development in floodplains presently exists has not been compiled, although the basic information is available from Regional Offices of the Federal Insurance Administration. Only six of the 31 case study areas (less than one-fifth of the total) experienced enough floodplain development to justify using the floodplain alone as the case study boundary. It is believed, however, that the basic observation that many communities do not have significant development in floodplains is accurate. Natural features such as steep slopes, wet soils, and frequent flooding tend to restrain development in many floodplains. In each of the regions included in the study, however, there are communities where floodplain development problems are severe.

FIGURE 4

FEDERAL PROGRAMS WITH
POTENTIAL FLOODPLAIN IMPACTS

*The following list of programs was used during case study interviews

<u>PROGRAM OR PROJECT</u>	<u>AGENCY</u>
Waste Treatment Facilities Program	U.S. Environmental Protection Agency
Sewer and Water Facilities Program	Farmers Home Administration, U.S. Department of Agriculture
Public Works Program	Economic Development Administration, U.S. Department of Commerce
Coastal Energy Impact Program	Office of Coastal Zone Management, U.S. Department of Commerce
Federal Aid Highway Program	Federal Highway Administration, U.S. Department of Transportation
Urban Mass Transit Program	Urban Mass Transit Administration, U.S. Department of Transportation
Community Development Block Grant Program	Office of Community Planning and Development, U.S. Department of Housing and Urban Development
Flood Control Projects (Dams, Reservoirs, Channels, Levees)	U.S. Army Corps of Engineers
Watershed Protection and Flood Prevention Program (Channels and Dikes)	Soil Conservation Service, U.S. Department of Agriculture
Public Works Projects (Dams and Reservoirs)	Tennessee Valley Authority
Public Works Projects (Dams and Reservoirs)	Bureau of Reclamation, U.S. Department of the Interior
Federal Housing Assistance and Mortgage Programs	U.S. Department of Housing and Urban Development
Coastal Zone Management Program	Office of Coastal Zone Management, U.S. Department of Commerce
'208' Areawide Water Quality Management Program	U.S. Environmental Protection Agency
'701' Comprehensive Planning Assistance Program	U.S. Department of Housing and Urban Development
Urban Studies Program	U.S. Army Corps of Engineers
'404' Wetlands Permit Program	U.S. Army Corps of Engineers
National Pollutant Discharge Elimination System (NPDES) Permit Program	U.S. Environmental Protection Agency
National Flood Insurance Program	Federal Insurance Administration, U.S. Department of Housing and Urban Development
National Environmental Policy Act	Council on Environmental Quality

FIGURE 5

ATLANTA REGION - LOCATION CHARACTERISTICS

Location Characteris- tics	Case Study Locations	TYPE OF COMMUNITY						TYPE OF FLOODPLAIN						TYPE OF STUDY AREA					
		1. Small town - no growth	2. Small town - moderate growth	3. Small town - rapid growth	4. Metropolitan area - no growth	5. Metropolitan area - moderate growth	6. Metropolitan area - rapid growth	1. Extensive bottomland hardwood swamp	2. Small swamp or area with drainage problems	3. Low-lying coastal floodplain	1. City - Major portion	2. Drainage Basin	3. Floodplain Only	4. Service area of treatment plant	FLOODPLAIN USES	1. Urban development	2. Open space/Park	3. Agriculture	4. Undeveloped
Mill Creek Basin, Columbia, S.C.						X		X			X								
Batesburg Leesville, S.C.		X						X		X			X						X
Pocataligo River Basin, Sumter, S.C.						X		X		X	X		X	X					X
Perry, Georgia				X				X		X			X	X					X
Rocky Creek & Tobosofkee Ck. Basins, Macon, Ga.						X		X			X		X						X
North Myrtle Beach, S.C.				X						X			X			X			
North Macon Co., Alabama		X						X	X		X		X						X
Morning Creek Basin, Fulton Co., Georgia						X		X			X		X						X
Buford & Sugar Hill, Georgia			X					X		X	X		X						X
Tybee Island, Georgia		X								X	X		X	X					

FIGURE 6

KANSAS CITY REGION - LOCATION CHARACTERISTICS

Case Study Locations	Location Characteristics	TYPE OF COMMUNITY															
		1. Small town - no growth		2. Small town - moderate growth		3. Small town - rapid growth		4. Metropolitan area - no growth		5. Metropolitan area - moderate growth		6. Metropolitan area - rapid growth		TYPE OF FLOODPLAIN			
		TYPE OF STUDY AREA															
		1. City - major portion															
		2. Drainage basin															
		3. Flood plain only															
		4. Service area of treatment plant															
		FLOODPLAIN USES															
		1. Urban development															
		2. Open space/park															
		3. Agriculture															
		4. Undeveloped															
York, Nebraska				X									X				
Manhattan, Kansas									X				X				
DeSoto, Kansas		X									X	X				X	
Wamego, Kansas			X								X	X			X		
Pleasant Hill, Missouri			X									X			X		
Harlan, Iowa		X										X					
Omaha, Nebraska								X			X	X			X	X	
Davenport, Iowa							X							X			
Council Bluffs, Iowa							X				X	X		X			
North Kansas City, Kansas									X		X	X		X	X		

FIGURE 7

DENVER REGION - LOCATION CHARACTERISTICS

Location Charac- teristics Case Study Locations	TYPE OF COMMUNITY																			
	1. Small town - no growth 2. Small town - moderate growth 3. Small town - rapid growth 4. Metropolitan area - no growth 5. Metropolitan area - moderate growth 6. Metropolitan area - rapid growth						TYPE OF FLOODPLAIN 1. Major riverine floodplain 2. Creek with flooding 3. High water table 4. Intermittent stream				TYPE OF STUDY AREA 1. Entire city or urban area 2. Drainage basin 3. Floodplain only 4. Service area of treatment plant				FLOODPLAIN USES 1. Urban development 2. Open space/park 3. Agriculture 4. Undeveloped					
Rock Springs, Wyoming			X						X			X				X				
Hyrum, Utah (Little Bear River)			X							X		X								X
Wellsville, Utah (Little Bear River)			X							X		X								X
Missoula, Montana					X				X			X		X	X	X	X			
Grand Junction, Colorado					X			X						X			X			
DeSmet, South Dakota	X									X	X	X		X						X
Howard, South Dakota	X									X	X	X		X			X X			
Keystone, South Dakota	X								X X							X				
Monroe, South Dakota	X									X	X									X
Wasta, South Dakota	X								X			X							X X	
Rapid City, South Dakota					X			X								X (prior to flood)				

FIGURE 8

ATLANTA REGION - EFFECT OF FEDERAL PROGRAMS ON DEVELOPMENT

Case Study Locations	Federal Programs	'701' Wastewater Treatment Works Program - EPA	Federal-Aid Highway Program - DOT	Community Development Block Grant Program - HUD	Other Sewer and Water Programs	National Flood Insurance Program - HUD	Public Works Program - EDA	Low and Moderate Income Housing Programs - HUD	Land and Water Conservation Fund - ICWS	Public Works Projects - Army Corps of Engineers	'701' Comprehensive Planning Assistance - HUD
Mill Creek Basin, Columbia, S. C.		o	o-e-d								
Batesburg & Leesville, S. C.		o-a-d		o				o			
Pocataligo River Basin, Sumter, S. C.		o	o	o		o	o	o	o	o	o
Perry, Ga.		o-e-d	o	o-e-d	o-e-d	o-d-f		o			o
Rocky Creek & Tobosofokee Ck. Basins, Macon, Ga.		o-a-d	o-a-d			o-d-f		o			o
North Myrtle Beach, S. C.		o	o			o					
North Macon Co., Alabama		o-a-d	o	o	o-a-d	o	o	o	o		o
Morning Creek Basin, Fulton Co., Ga.		o-a-d	o-a-d			o-d-f		o			
Buford & Sugar Hill, Ga.		o-a-d	o-e-d		o						
Tybee Island, Georgia		o				o				o	

KEY:

o = program occurred
 e = encouraged
 a = allowed
 d = discouraged
 f = floodplain
 d = community development (excluding floodplain)

Examples:

o-e-f means that the program occurred and encouraged development in the floodplain.

o-a-d means that the program occurred and allowed development outside of the floodplain.

FIGURE 9

KANSAS CITY REGION - EFFECT OF FEDERAL
PROGRAMS ON DEVELOPMENT

Case Study Locations	Federal Programs	*201' Wastewater Treatment Works Program - EPA	Federal-Aid Highway Program - DOT	Community Development Block Grant Program - HUD	Other Sewer and Water Programs	National Flood Insurance Program - HUD	Public Works Program - EDA	Low and Moderate Income Housing Programs - HUD	Land and Water Conservation Fund - HCS	Public Works Projects - Army Corps of Engineers	*701' Comprehensive Planning Assistance - HUD
York, Nebraska		o-e-d	o			o		o	o-d-f		o-d-f
Manhattan, Kansas		o-a-d	o	o						o-a-d	
DeSoto, Kansas		o-a-d (future)	o-e-d (future)			o-d-f	o				
Wamego, Kansas		o-a-d	o-a-d			o		o			o
Pleasant Hill, Missouri		o-a-d				o	o				
Harlan, Iowa		o	o			o		o			o
Omaha, Nebraska		o-e-d	o			o-d-f	o-e-d			o-a-d	o
Davenport, Iowa		o	o			o-d-f (future)			o-d-f	o-e-d (future)	o
Council Bluffs, Iowa		o-e-d	o			o-d-f				o-a-d	
Kansas City, Kansas		o-a-d	o-e-d			o				o-a-d	o

KEY:

o = program occurred
e = encouraged
a = allowed
d = discouraged
f = floodplain
d = community

development
(excluding floodplain)

Examples:

o-e-f means that the program occurred and encouraged development in the floodplain.

o-a-d means that the program occurred and allowed development in the community outside of the floodplain.

FIGURE 10

DENVER REGION - EFFECT OF FEDERAL PROGRAMS ON DEVELOPMENT

Case Study Locations \ Federal Programs	'201' Wastewater Treatment Works Program - EPA	Federal-Aid Highway Program - DOT	Community Development Block Grant Program - HUD	Other Sewer and Water Programs	National Flood Insurance Program - HUD	Public Works Program - EDA	Low and Moderate Income Housing Programs - HUD	Land and Water Conservation Fund - HCRS	Public Works Projects - Army Corps of Engineers	'701' Comprehensive Planning Assistance - HUD
Rock Springs, Wyoming	o-a-f	o	o			o				
Hyrum, Utah (Little Bear River)	o-e-d		o	o				o		
Wellsville, Utah (Little Bear River)	o-a-d		o-e-d					o		
Missoula, Montana	o-a-d	o	o-a-d				o	o	o-a-f	
Grand Junction, Colorado	o	o			o		o	o		
DeSmet, South Dakota	o-e-d (if annexation occurs)							o-p-f		
Keystone, South Dakota	o-a-f	o				o				
Monroe, South Dakota	o-a-d			o						
Wasta, South Dakota	o	o				o				
Rapid City, South Dakota	o	o	o	o		o	o	o-p-f	o	

KEY:

o - program occurred
e = encourage
a = allow
d = discourage (excluding floodplain)

Examples:

o-e-f means that the program occurred and encouraged development in the floodplain
o-a-d means that the program occurred and allowed development outside of the floodplain.

FIGURE 11

**EFFECTS OF FEDERAL PROGRAMS ON SECONDARY DEVELOPMENT:
SUMMARY OF CASE STUDIES**

Number of Cases Federal Program	'201 Wastewater Treatment Works- EPA	Federal-Aid Highway Program - DOT	Community Development Block Grant Program-HUD	Other Sewer and Water Programs - HUD and FHA	National Flood Insurance Program-HUD	Public Works Program-EDA	Low-Moderate Income Housing Program-HUD	Land and Water Conservation Fund-HCRS	Public Works Projects- Army Corps	'701' Comprehensive Planning Assistance Program-ED
Program Occurred	31	23	9	9	17	10	12	12	9	10
Program had no effect on development	9	16	8	6	10	9	12	8	3	9
Program encouraged community development	6	4	1	2	0	1	0	0	1	0
Program encouraged floodplain development	0	0	0	0	0	0	0	0	0	0
Program allowed community development	14	3	0	1	0	0	0	0	4	0
Program allowed floodplain development	2	0	0	0	0	0	0	0	1	0
Program discouraged community development	0	0	0	0	0	0	0	0	0	0
Program discouraged floodplain development	0	0	0	0	7	0	0	4	0	1

Figures 8, 9, and 10 indicate the major federal programs affecting development in the case studies in each region. Figure 11 summarizes the findings for federal planning and construction programs which occurred in 8 or more case study locations. Detailed information for each case study is included in Part II of this report.

When reviewing the information from the cases, it should be remembered that the study area included both floodplain and non-floodplain lands in all but six cases. As a result, more information was obtained on the impact of federal programs on general community development than specific effects on floodplain development. Cases where little or no floodplain development was present reflected the natural conditions or local government regulations which restricted development.

If only communities with floodplain development had been included as case studies, it is believed that similar findings concerning the effect of federal programs would have been observed. Many of the types of pressures leading to floodplain development are the same as the pressures leading to upland development.

The following programs were most frequently encountered in the 31 case studies and, therefore, have been tabulated on Figures 8, 9, and 10:

- . '201' Wastewater Treatment Works Program - U.S. Environmental Protection Agency;
- . Federal-Aid Highway Program - U.S. Department of Transportation;
- . Community Development Block Grant Program - U.S. Department of Housing and Urban Development;
- . Other federal agency sewer and water programs, including the Sewer and Water Facility Loan and Grant Program of the Farmers Home Administration, U.S. Department of Agriculture, and Sewer and Water Loans and Grants from the U.S. Department of Housing and Urban Development;
- . National Flood Insurance Program - U.S. Department of Housing and Urban Development;

- . Public Works Program - Economic Development Administration;
- . Low and Moderate Income Housing Programs (not including mortgage insurance) - U.S. Department of Housing and Urban Development;
- . Land and Water Conservation Fund Program - Heritage Conservation and Recreation Service, U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation);
- . Public Works Projects - U.S. Army Corps of Engineers; and
- . '701' Comprehensive Planning Assistance Program - U.S. Department of Housing and Urban Development.

Background information about the legal authority, purpose and direction for these federal programs is included in Part II of this study titled "Methods Used by Federal Programs to Reduce Floodplain Development Pressures." The specific nature of the federal programs in each case study is described in Part III of this study.

Certain other federal programs were found to be carried out in the majority of communities surveyed. These programs include:

- . National Pollutant Discharge Elimination System Permit Program (NPDES) - U.S. Environmental Protection Agency;
- . '404' Permit Program - U.S. Army Corps of Engineers;
- . Mortgage insurance programs - Farmers Home Administration, U.S. Department of Agriculture, and the Federal Housing Administration, U.S. Department of Housing and Urban Development; and

- . '208' Areawide Water Quality Management Program -
U.S. Environmental Protection Agency.

Although these programs frequently occur, they were found in the case study communities to have little effect on floodplain protection or development and, therefore, are not listed on the summary charts.

The number and type of federal programs in effect in each case study community varied significantly. In some case study locations, nearly every federal program had occurred. In other cases only the '201' Wastewater Treatment Works Program and perhaps one or two other programs had taken place. A complete listing of the federal programs noted by the persons interviewed is contained in the case study summaries (Part III).

The charts shown on Figures 8, 9, 10, and 11 indicate whether the program was used in the case study area and also indicate the effect of the program on development, as identified by the persons interviewed. In some cases, the federal program affected development in the floodplain while in other cases, development in the entire case study area was affected. Some programs were found to encourage development while others allow development to take place. Several programs discourage development in the floodplain.

Very few federal programs were found to encourage or allow urban development, either in the floodplain or the entire case study area. Many persons interviewed observed that federal programs helped to improve the attractiveness of the community and the "liveability" of communities. Typically, the primary forces encouraging growth and development were private industries or major institutions which provided jobs and stimulated in-migration. Many federal programs have been necessitated by population growth and development. Exceptions to this statement are federal agencies which purchase land and provide major employment bases and the three federal programs reviewed below.

Three federal programs were found to either encourage or allow development in a number of case study locations. These programs include:

- . '201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency;
- . Public Works Program (individually authorized through Congressional resolutions), U.S. Army Corps of Engineers; and
- . Federal-Aid Highway Program, U.S. Department of Transportation.

Particular findings concerning each of the federal programs are presented below.

'201' Wastewater Treatment Works Program, U.S. Environmental Protection Agency:

The impact of wastewater treatment facility construction on development is affected by the type and location of the facilities, growth and development patterns in the community, soil types, and local government regulations pertaining to public facilities, among other factors. The predominant effect of the Program noted in the case studies is that it allows development to occur.

Out of 31 case studies where '201' wastewater treatment facilities were being planned and constructed, a total of 16, or approximately 50 percent, allowed urban development to take place. Often the facilities (especially interceptor lines) had the effect of permitting higher densities of development and directing development to certain locations in the community.

In 6 of the 31 cases, the '201' Wastewater Treatment Works Program encouraged development. This finding primarily applies to two situations: (1) situations where small communities require sewer facilities to be attractive places for new industry; and (2) situations where development on septic tanks is difficult or prohibited, and where sewer facilities are a pre-requisite for any development.

In 9 of the 31 cases, the '201' Wastewater Treatment Works Program had no impact on growth and development. In some cases, the '201' program facilities were an extension or expansion of present facilities and not of a significant magnitude to stimulate development. In other cases it was clearly stated by officials that development could easily occur on septic tanks or small package treatment plants and that the treatment facilities did not influence development although they were a community amenity.

Because of the approach to the selection of the case study locations, very few of the '201' projects reviewed were for large, regional treatment facilities serving two or more municipalities and large unincorporated areas. In order to obtain information from communities where '201' facilities were far along with planning or under construction, projects completed prior to 1977 were reviewed whenever possible. It is suspected that a survey of opinions concerning potential impacts of large, regional wastewater treatment projects would result in a higher percentage of responses that the facilities allow development to occur.

Almost every person interviewed had very clear and definite views concerning the effect of '201' facilities on urban development. This fact, combined with the geographic distribution of the facilities which were found to affect development, suggest that certain geographic areas can be delineated where development impacts from the provision of sewer facilities are most likely to occur. Areas where development pressures exist and where soils prohibit septic tanks are likely to experience greater development impacts from the '201' Program.

Development impacts from other sewer and water programs funded by the U.S. Department of Housing and Urban Development and by the Farmers Home Administration of the U.S. Department of Agriculture were expected to vary from the '201' Wastewater Treatment Works Program because they often provide funds for collector sewer lines rather than for interceptor construction. The collector sewer lines are often small projects and are often extended to homes and businesses either during or after development has actually taken place. The construction of wastewater treatment plants and major interceptor sewers are more likely to have secondary development impacts than collector sewer lines.

. Public Works Projects, U.S. Army Corps of Engineers:

Out of 9 communities where public works projects constructed by the U.S. Army Corps of Engineers were reported, 6 projects resulted in some type of development impact. All projects where impacts were reported involved the construction of dikes or levees for flood protection.

Levee and dike construction has often been carried out in locations where flooding occurs regularly and creates high hazard conditions, endangering lives and property. Without structural protection from floods, development could not take place since it would be subject to destruction on a frequent basis. In such cases, the construction of the levee or dike actually changes the location of the floodplain for purposes of floodplain management. Although the "natural" floodplain is in the same location, the area of high hazards where special regulations or development control programs may be needed is altered. The degree to which the structure actually affects flood hazards, of course, affect the location of the 100-year floodplain.

The primary effect of levee construction in the cases surveyed is that the structure allows development to occur. In Davenport, Iowa, if a levee is actually constructed along the Mississippi River (plans have been completed), planners believe that the project will actually stimulate or encourage development.

In Missoula, Montana, the construction of a major dike along the Clark Fork River has allowed some floodplain development to occur. This is largely because the precise boundaries of the floodplain were not known when the project was constructed between 1970 and 1975. Now that floodplain boundaries have been properly delineated, the project is only allowing development outside of the floodplain to occur.

. Federal-Aid Highway Program, U.S. Department of Transportation:

The Federal-Aid Highway Program was frequently reported in the case study communities (23 times out of 31 cases). Projects reported included Interstate highway construction, major U.S. highway construction, and smaller road repair projects. Because of the variety of types of highway projects, the survey results must be cautiously reviewed.

In seven of the 23 instances where the Federal-Aid Highway Program occurred, the Program either encouraged or allowed development to take place. Most of the communities where the Program has affected development are suburban or outlying areas within commuting distance of major metropolitan areas. The construction of a major highway or Interstate, in these cases, provides important access to jobs and commercial centers and is a positive force encouraging or allowing development to occur. In the Rocky Creek and Tobosofkee Creek Basin case study (Macon, Georgia), the construction of an Interstate highway combined with the construction of a major sewer interceptor has allowed urban development to take place.

Although community development impacts from the '201' Wastewater Treatment Works Program, the Federal-Aid Highway Program, and the Public Works Program of the U.S. Army Corps of Engineers were observed most frequently in the case studies, it is believed that almost all federal programs have impacts on growth and development in certain cases. Because of the small number of case studies, major development impacts from certain federal programs were not recorded. However, sewer interceptors and treatment plants, major highways, and the construction of dikes and levees in flood-prone areas have potential development impacts which tend to occur more frequently.

The impact of federally-owned facilities or installations, such as air force bases, on community growth and development was noted in several case studies. Federal facilities that provide local employment are potential stimulators of floodplain development.

Although no single federal program provides specifically for the planning or regulation of comprehensive floodplain management at the local level, two federal programs were found to have significant impacts on floodplain development control. These programs, which were noted by officials interviewed as being factors which discourage floodplain development, include the National Flood Insurance Program administered by the Federal Insurance Administration of the U.S. Department of Housing and Urban Development and the Land and Water Conservation Fund Program of the Heritage Conservation and Recreation Service U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation). The effects observed from each of these programs are summarized below.

- National Flood Insurance Program, U.S. Department of Housing and Urban Development:

Many of the communities included in the case studies have been accepted into the National Flood Insurance Program or are in the process of being accepted. The Program is clearly providing needed information to local communities concerning the location of floodplain boundaries and in a number of cases, is providing a vehicle for community education

concerning floodplain management.¹

Of the 17 communities which reported that they are now participating in the National Flood Insurance Program, 10 indicated that the Program has no effect on development while 7 indicated that the Program has discouraged floodplain development. Persons from areas where development was located in floodplains almost always noted that the program was discouraging development. The only exceptions are locations where local officials feel that local government regulations adopted prior to the federal program have provided the necessary floodplain guidance. The ten communities which noted that the Program has not affected development are primarily areas where floodplain development has not occurred.

It is recognized that the National Flood Insurance Program is multi-faceted, including technical floodplain studies, requirements for flood insurance, and requirements for local government regulations for flood hazard protection. Officials interviewed emphasized that the local government regulations were the aspect of the National Flood Insurance Program which is discouraging growth and development. The regulations require flood-proofing and the elevation of structures, and they often have the effect of encouraging development to take place in areas outside of floodplains.

. Land and Water Conservation Fund Program, U.S.
Department of the Interior

The Land and Water Conservation Program, administered by the Heritage Conservation and Recreation Service of the U.S. Department of the Interior (formerly the Bureau of Outdoor Recreation), provides funds for the acquisition and development of park and recreation areas. Twelve of the 31 cases reviewed in this study have received funds

¹ According to officials in the Atlanta, Kansas City, and Denver Regional Offices of the Federal Insurance Administration, efforts are made to make local communities aware of comprehensive floodplain management needs and approaches, as well as the specific requirements of the National Flood Insurance Program for flood hazard protection.

through the Program. In four of those cases (one-third of all cases where the Land and Water Conservation Fund Program was being used) the Program was found to significantly discourage floodplain development. In three cases, the funds were used to acquire floodplain lands for public park and recreation areas. In the cases of York, Nebraska; Davenport, Iowa; and Rapid City, South Dakota, the Program has been an important floodplain management tool for local governments.

In 1978, President Carter announced the National Heritage Trust Program, which will encompass the Land and Water Conservation Fund Program. Although Program details are presently being developed, the Program will continue to provide funds for park and open space acquisition and development in floodplain areas.²

In one of the case studies...Rapid City, South Dakota... federal program efforts to assist with flood damage clean-up and future floodplain management were documented. It is significant to note that the Urban Renewal Program of the U.S. Department of Housing and Urban Development provided major funding for land acquisition and clearance following the devastating flood of 1972. Other federal programs provided repair funds which were primarily used in areas outside of the critical 100-year floodplain. The Land and Water Conservation Fund Program provided funds for park-land acquisition in the floodplain. Because of the unique timing and serious effects of the Rapid City flood, federal program efforts were particularly significant.

In summary, the major findings from the case studies concerning federal programs and secondary development impacts include the following:

1. Three federal programs the '201' Wastewater Treatment Works Program, (U.S. Environmental Protection Agency), the Public Works Program (U.S. Army Corps of Engineers) and the Federal-Aid Highway Program (U.S. Department of Transportation)

² Telephone interview with Mr. Paul Pritchard, Assistant Director, Heritage Conservation and Recreation Service, U.S. Department of the Interior, May 11, 1978.

were found to affect secondary development in a significant number of case study locations. The predominant impact identified is that these programs allow development to occur.

2. Only six of the case studies reviewed had significant development in the floodplain. The predominant reason for the lack of floodplain development in the case study locations was natural features which made development difficult and uneconomical. Few federal programs in these six communities allowed or encouraged floodplain development. This fact leads to the finding that floodplain development pressures exist in only a segment of the communities receiving federal funds. In many cases it is possible to identify in advance the communities where advance floodplain impacts are likely to occur.
3. Two federal programs, the National Flood Insurance Program and the Land and Water Conservation Fund Program, were found to discourage floodplain development. The National Flood Insurance Program requires local government flood hazard regulations as a pre-requisite for eligibility for flood insurance. The Land and Water Conservation Fund Program protects floodplains by providing funds for the acquisition and development of parklands.

D. Present Approaches to the Reduction of Floodplain Development Pressures

During the course of the study, meetings with EPA Regional Offices were conducted to discuss present approaches used for reducing floodplain development pressures. During the meetings, it was noted that informal coordination with the Federal Insurance Administration typically occurs when floodplain development issues related to wastewater treatment facilities are identified. For this reason, telephone contacts with the FIA Regional Offices in Kansas City, Denver, and Atlanta were also made. The following observations summarize findings from the EPA meetings and FIA telephone contacts:

- . EPA Regional Offices noted that questions concerning floodplain development impacts are examined on a case-by-case basis. Typically the potential for floodplain development impacts is identified by the EPA Regional Office when the environmental review is conducted and after the Step 1 Facility Plan has been completed.
- . Grant conditions which restrict hookups in floodplain areas are sometimes used as a method for reducing floodplain development impacts. Many EPA Regional Office personnel question whether grant conditions can be enforced after final payment on the '201' grant has been made.
- . Other mitigation measures, such as the relocation or redesign of a facility are also used by EPA Regional Offices although they are more difficult to implement. Project delays often occur because the floodplain development issue is not identified until after the Step 1 Facility Plan has been completed.
- . Major floodplain development questions and issues have arisen for only a small number of '201' Wastewater Treatment Facility projects. When issues do arise, discussions and coordination with the Federal Insurance Administration often occur. When the Floodplains Management Executive Order (No. 11988) is fully implemented, closer coordination procedures may be established, since FIA is charged in the Order as the primary federal source of floodplain information. At present, formalized procedures for coordination do not exist.
- . Two types of information are available from the Federal Insurance Administration which can be extremely useful in planning wastewater treatment facilities which are compatible with floodplains. First, FIA's Flood Hazard Boundary maps provide data for nearly all communities in each state. These maps are generalized and not normally based on a detailed analysis of the floodplain.

In the process of discussing floodplain development and impact questions related to wastewater treatment facilities, background information concerning two '201' wastewater treatment works grants which have resulted in floodplain impact questions and issues was collected. The Riverside Lakes, Nebraska project is a useful example of steps taken by the regional planning agency in the area and the Kansas City EPA Office to reduce floodplain impacts. The Mississippi project illustrates the involvement of FIA and EPA in a case where the wastewater treatment facilities were found to have adverse impacts on the floodplain. Although secondary development impacts were not the primary concern, this second example illustrates the cooperation of FIA and EPA in a floodplain impact issue.

The specific situation, actions, and implications for each of these illustrations are described below.

1. Riverside Lakes Project, Nebraska¹:

Located 10 miles west of Omaha, Nebraska, "Riverside Lakes" is the area serviced by Sanitary Improvement District No. 177 of Douglas County, Nebraska. The District presently operates a wastewater treatment facility and has applied to the U.S. Environmental Protection Agency (Kansas City Office) for funds to expand the facility. The District has been seeking construction funding since 1971.

The area to be served by the expanded treatment plant is located on the alluvial plain adjacent to the Elkhorn River. The terrain is low and flat and subject to flooding. Present residential development, however, is elevated on fill, with first floor elevations approximately 5 feet above the 100-year flood level.

¹ Information on the Riverside Lakes Project was provided by Mr. Wayne Wiley, Environmental Planner, Metropolitan Area Planning Agency, Omaha, Nebraska and Mr. Thomas Robertson, Project Engineer, Kansas City Office, U.S. Environmental Protection Agency.

The potential for adverse floodplain development impacts was first noted by the Metropolitan Area Planning Agency (MAPA), a multi-jurisdictional planning council composed of local officials in the Omaha-Council Bluffs area. In August, 1975 when MAPA reviewed the Step 1 facility planning application (through the A-95 review process), the regional planning agency noted that the proposed site for the facility and portions of the wastewater treatment service area were located in the floodplain.

In the 1975 - 1977 period, the facility plan was prepared for the Riverside Lakes Project. At the recommendation of the U.S. Environmental Protection Agency, the facility was designed to serve a 10-year population growth in order to minimize adverse impacts on the floodplain.

EPA's reasons² for reducing the project design period included the following:

- . Using the historical growth trend, the necessary population would not be reached;
- . The estimated user charge was excessively high;
- . Excess reserve capacity can encourage and accelerate growth in surrounding areas;
- . Of the 297 lots above the 100-year flood elevation, 209 lots are unoccupied and utility serviced. Prohibition of future development would cause severe economic hardship; and
- . There are approximately 12 occupied lots below the 100-year floodplain and outside the District which may be served by the wastewater treatment plant.

When the Step 2 application for funding was reviewed by MAPA, several specific questions were raised. The regional planning agency questioned whether adequate floodproofing for the treatment facility itself had been included in the proposal. In addition, the agency questioned the proposed provision of service to areas in the floodplain (beyond

² Written Communication from EPA, Kansas City Office, May 22, 1978.

existing residential areas). After further discussion, however, it was agreed that the ten-year design period included in the environmental impact appraisal and negative declaration proposed by the U.S. Environmental Protection Agency would allow enough growth to provide an adequate tax base for the area while, at the same time, not providing sewer service for too large a population in the flood prone area.

During 1977 and 1978 when the Step 2 and Step 3 grant applications were considered, the U.S. Environmental Protection Agency provided additional protection against adverse floodplain impacts. As stated in the environmental impact appraisal and negative declaration prepared by EPA, the following condition should be placed on the Step 2 and Step 3 facility grants:

"The sewer use ordinance of Sanitary District #177, Douglas, County, Nebraska shall not permit any connection which would discharge wastewater into any collection line, lateral sewer, interceptor, or other means of conveying wastewater to the treatment plant if such wastewater originates from any building or facility which is erected or otherwise placed, after the date of this agreement, upon land which is a wetland as defined in Executive Order 11990 dated May 24, 1977, and/or located in an area subject to 100-year flood as defined by the Federal Insurance Administration elevation study. Pending the completion and adoption of the Federal Insurance Administration's flood elevation study, the 100-year flood elevation of the Elkhorn River in the vicinity of the district shall be considered to be 1117.5 feet M.S.L."

As stated in the environmental impact appraisal document, this condition provides for the protection of environmentally sensitive areas and constitutes a bilateral agreement between EPA and the District. The condition may be enforced by any person and/or agency who has an interest in the protection of such areas. The grant condition was strongly supported by MAPA.

The review of the proposed wastewater treatment facility at Riverside Lakes is continuing, although floodplain impact and management questions appear to have been resolved.

The Riverside Lakes situation illustrates two useful points concerning floodplain development assessment and wastewater treatment facilities:

1. The Metropolitan Area Planning Agency (MAPA), through the A-95 process, properly identified potential floodplain development and impact questions at an early stage in the facility planning process and served a useful review role throughout the '201' planning period; and
2. The U.S. Environmental Protection Agency (Kansas City Office) played a major role during the Step 1 facility planning process of reducing potential floodplain impacts by urging a 10-year population level and by including sewer hook-up restriction requirements as part of the Step 2 and Step 3 grant.

The involvement of the Metropolitan Area Planning Agency as well as EPA led to an appropriate resolution of the floodplain development impact question at Riverside Lakes. The role of the Federal Insurance Administration was to provide technical information on the location of the floodplain and nature of flood hazards.

Although not evaluated in detail, it is believed that this illustration also reflects the growing awareness of government agencies to floodplain development impact and floodplain management questions. When the facility plan was initially reviewed by MAPA, it was felt that a 10-year projection was reasonable. This would allow Riverside Lakes to expand its tax base and still not develop areas of the floodplain which were not already elevated. The major concern of MAPA and EPA has been to eliminate an existing water quality problem without encouraging additional development in the floodplain.

2. Wastewater Treatment Facility Project in Meridian, Mississippi¹:

In Meridian, Mississippi, a wastewater treatment facility

¹ Information provided by Mr. George Collins, Chief, South Area Operations Branch, Atlanta Regional Office, U.S. Environmental Protection Agency; Mr. Richard Gingrich, Natural Resources Manager, Atlanta Regional Office, U.S. Environmental Protection Agency, and Mr. Glenn Woodard, Regional Director, Atlanta Regional Office, Federal Insurance Administration.

was proposed for construction which could affect floodplain development. The U.S. Environmental Protection Agency and the Federal Insurance Administration of the U.S. Department of Housing and Urban Development worked together with the City of Meridian to resolve the issue.

Preliminary information on the location of the 100-year floodplain and floodway was available to the City of Meridian from an FIA Flood Insurance Study prepared by the Corps of Engineers. Regulations of the Federal Insurance Administration require that communities adopt a floodplain management ordinance after completion of a Flood Insurance Study which establishes a floodway. The ordinance must include the following provision:

Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood without increasing the water surface elevation of that flood more than one foot at any point. (FIA criteria, 1910.3(d)(2))

The floodway is the portion of the floodplain adjacent to the river which includes the overbank area capable of carrying deep and fast moving waters.

Meridian's ordinance was due for adoption on or before December 15, 1977. When the city failed to adopt an Ordinance, the City was suspended from the National Flood Insurance Program. The suspension ultimately led to the conflict with EPA.

When wastewater treatment facilities are constructed in the floodway, the boundaries of the floodplain are often affected. For this reason, the Federal Insurance Administration and the U.S. Environmental Protection Agency direct floodplain facilities to locations outside of the floodway and, in some cases, when possible, completely outside of the floodplain.

Two positive actions have been taken by the City of Meridian to resolve the issue and to allow the facility planning and engineering design process to continue. First, the City and the Federal Insurance Administration have arranged for the U.S. Army Corps of Engineers to rerun the floodway model to determine if a reorientation of the proposed addition to the wastewater treatment facility would have a different effect on the floodway.

In addition, the City has complied with National Flood Insurance Program requirements by adopting an ordinance in compliance with FIA criteria, including floodway controls. Meridian's ordinance was adopted on March 22, 1978, with an effective date of April 22, 1978, or 30 days after passage. Meridian was reinstated into the NFIP effective March 28, based on the adoption of the ordinance. However, the ordinance was not acceptable to FIA since it was not effective until April 22, 1978. In order to assure proper construction standards in floodplain areas and avoid possible high flood insurance rates during this 30-day period, a moratorium was placed on new construction until April 22, 1978, the effective date of the ordinance.

In addition, the City is complying with National Flood Insurance Program requirements by adopting an ordinance which places a moratorium on development in the floodplain. The City is presently reinstated in the National Flood Insurance Program, and insurance at low rates is available to community residents.

This example illustrates several points concerning the identification of floodplain impacts related to wastewater treatment facilities:

1. Even when floodplain boundary information and other technical studies are available to consulting engineers and communities preparing Step 1 Facility Plan, the information is not always considered in detail during Step 1.

2. When major technical impacts are identified which require additional studies after the completion of the Step 1 Facility Plan, delays in Step 2 and Step 3 grant approval can result.
3. The Federal Insurance Administration and the U.S. Environmental Protection Agency have some similar concerns related to floodplain impacts and floodplain management, and can assist each other in obtaining floodplain management objectives at the local level. In the case of the City of Meridian, Mississippi, EPA held up a '201' grant until the City complied with requirements of the Federal Insurance Administration. In turn, the specific requirements of the Federal Insurance Administration for the adoption of local floodplain management regulations led to a development moratorium in the floodplain area. (Although a moratorium on floodplain development is not required for admission to the National Flood Insurance Program, the situation in Meridian led to federal agency agreement that this was necessary for the protection of public health and safety.)

As shown by this example, the Atlanta Regional Office of EPA addresses floodplain impact issues when they become apparent.

CHAPTER THREE

RECOMMENDATIONS FOR THE
IDENTIFICATION AND REDUCTION OF FLOODPLAIN
DEVELOPMENT IMPACTS

A. Introduction

Floodplain management is a complex process, both technically and administratively. From a technical standpoint, the location of the floodplain and the effects of various projects such as wastewater treatment plants must be assessed. The identification of the magnitude of secondary development impacts and the determination of appropriate government policy concerning the proper use of the floodplain pose special challenges for government agencies.

Floodplain management is also complex from an administrative and inter-governmental standpoint. In the past, floodplain management has often been left to local governments. Federal agency concerns and responsibilities have increased in the past decade, however, and have been recently emphasized by President Carter's Floodplain Management Executive Order. Although local agencies manage many aspects of the private development approval process, federal agencies are clearly charged with the responsibility of identifying and mitigating potential floodplain impacts resulting from their actions.

The Floodplain Management Executive Order reinforces existing policies of the U.S. Environmental Protection Agency concerning floodplain protection and secondary development. Present policies of EPA emphasize the following:

Wastewater treatment facilities should, in general, be located outside of floodplains. Where such locations are not practicable, the plant and equipment should be protected against flooding.¹

¹U.S. Environmental Protection Agency, "Guidance for Preparing a Facility Plan", Revised, May, 1975, page 14.

- . When wastewater treatment facilities may induce construction in the floodplain, resulting flood hazards should be evaluated and practicable alternatives considered. The purpose of the evaluation is to "preclude the uneconomic, hazardous, or unnecessary use of floodplains, to minimize the exposure of facilities to potential flood damage, lessen the need for future federal expenditures for flood protection and flood disaster and preserve the unique and significant public value of the floodplain as an environmental resource."²
- . Wastewater treatment facilities projects with secondary development impacts "should be identified early and receive attention from the time they appear on the project priority list so that suitable agreements can be reached without delaying the project. Regions should work closely with states and local communities to ensure that evaluation of environmental impacts is fully integrated into the planning process."³

Given the fact that EPA has broad policies and concerns related to wastewater treatment facilities and floodplain impacts, then, how can the policies be effectively implemented? The answer to this question must be based upon an analysis of present floodplain development trends, issues, and approaches used by the U.S. Environmental Protection Agency. The major findings from the analysis lead directly to recommendations for administrative action in EPA.

This chapter recommends approaches for strengthening the ability of the '201' Wastewater Treatment Works Program to identify and mitigate floodplain development impacts.

²40 Federal Register No. 72, Section 6.214(b)(2), U.S. Environmental Protection Agency, April 14, 1975.

³U.S. Environmental Protection Agency, "Consideration of Secondary Environmental Effects in the Construction Grants Process," Program Requirements Memorandum PRM No. 75-26, June 6, 1975.

B. Recommendations: Floodplain Impact Mitigation Measures and the '201' Wastewater Treatment Works Program

Based upon the information collected and assessed over the past nine months concerning floodplain development pressures, federal programs, and the '201' Wastewater Treatment Works Program, recommendations for the identification and reduction of floodplain development impacts from the '201' Program are presented.

The recommendations described here pertain solely to floodplain protection, which is one of a number of environmental concerns which must be addressed by the '201' Wastewater Treatment Works Program. Why recommend special actions for floodplains alone? Why not address environmental issues in a comprehensive way?

The reasons for special floodplain recommendations are two-fold. First, as a result of the activities of the Federal Insurance Administration, information is available which may not be present for other environmental resources. Second, if there are some tasks which can be done to supplement comprehensive environmental reviews with small amounts of time, they should be seriously considered.

Before implementing floodplain development mitigation measures, however, the possibility of reducing environmental impacts on other resources through similar measures should be reviewed.

Recommendations pertain to the following subjects:

- . Identification of Floodplain Development Pressures and the '201' Program Planning Process;
- . Coordination Between the U.S. Environmental Protection Agency and the Federal Insurance Administration;

- . Interagency Coordination for Floodplain Impact Mitigation;
- . The Use of Grant Conditions for Sewer Hookup Restrictions; and
- . The Definition of Criteria and Standards for Floodplain Development Impacts.

The actions recommended should be of assistance in implementing the Executive Order on Floodplain Management as well as present EPA floodplain protection policies. Each subject is described below and specific recommendations are outlined.

1. Identification of Floodplain Development Pressures and the '201' Program Planning Process

The '201' Wastewater Treatment Works Program is organized into three stages, which are called Steps. Separate grants are provided for each Step. Step 1 focuses on the preparation of a facilities plan; Step 2 provides for engineering design specifications and Step 3 provides for facility construction. A detailed description of the '201' Program is included in Part II of this study titled "Methods Used By Federal Programs to Reduce Floodplain Development Pressures."

Typically, floodplain development impacts related to wastewater treatment facilities are not known to Regional Offices of the U.S. Environmental Protection Agency until the Step 1 Facility Plan has been received.¹ Unless the local community and consulting engineer have been particularly sensitive to floodplain development impacts and problems, alternative locations for the facility service area boundaries, and other mitigation measures may not be addressed in detail in the Step 1 Plan.

¹ This fact was highlighted in EPA Regional Office meetings conducted for this study, as well as the case studies on "Mitigating Secondary Impacts from the Wastewater Facilities Program" identified by the EPA Office of Land Use Coordination.

The Step 1 Facility Plan is clearly the point in the '201' process where floodplain impacts should be considered in-depth and recommendations for resolving impacts made. This is, in fact, mandated by EPA guidelines and regulations. However, there are many tasks to be accomplished through the Step 1 Facility Plan, and it is simply not possible with available resources to investigate every potential environmental impact.

It should, however, be possible to examine floodplain development impacts during the Step 1 stage in those cases where a potential for adverse impact exists. As identified by the case studies, floodplain development pressures do not result from all '201' facility grants. The National Wildlife Federation '201' Program review, for example, found floodplain development pressures in 13 percent of the projects reviewed. If '201' projects with a potential for floodplain impacts could be identified before Step 1 facility planning was initiated, notification could be provided to the responsible communities and '201' studies could examine the question in-detail.

The specific objective of the problem identification effort should be to identify whether the wastewater treatment facility is likely to provide service to existing or new development located in the floodplain. The precise nature of the impact, mitigation measures, alternative solutions to wastewater treatment needs, or the detailed boundary of the floodplain would not need to be identified until facility planning (Step 1) is initiated.

Recommendations:

The fact that the Federal Insurance Administration has identified the location of the 100-year floodplain and is working with local agencies on floodplain management ordinances provides a major opportunity for the U.S. Environmental Protection Agency. In order to identify proposed '201' Wastewater Treatment Works which potentially can have major impacts on floodplain development, it is recommended that early consultation with staff from the Federal Insurance Administration be initiated.

The responsibility for initiating the contacts rests with each Regional Office of EPA. After a treatment facilities priority list for each state has been compiled, a representative from EPA should meet with Federal Insurance Administration staff to review potential problems. Two tasks could be completed fairly quickly. First, officials at the Federal Insurance Administration should be requested to indicate communities on the '201' priority list which presently have extensive floodplain development or appear to be experiencing floodplain development pressures. Secondly, EPA staff should quickly review the proposed '201' facility planning study boundary with floodplain location maps in order to indicate the amount of floodplain area within the study area.

From an administrative standpoint, one or two environmental specialists or planners in EPA could complete the review of all priority lists. Detailed engineering expertise or flood hazard expertise would not be necessary to pinpoint the potential impacts. The information about potential floodplain impacts could then be transmitted to the responsible EPA facility engineers for review with '201' program applicants.

EPA staff would emphasize the need for floodplain development reviews when pre-application conferences are held. Typically, the need for floodproofing is emphasized during the pre-application conferences. The need for analysis of floodplain development pressures could easily be emphasized at this stage also, provided that the communities with potential impacts had been identified. EPA staff could also provide special technical assistance to local communities and engineers on floodplain impact questions for the specified communities.

In the future, it is possible that '208' areawide water quality management plans could include this basic task of potential floodplain development impact identification. The location and environmental impacts of wastewater treatment facilities is one of many assessments to be completed through the '208' Program which is also administered by the U.S. Environmental Protection Agency. To date, however, most '208' plans have not addressed floodplain development

questions related to wastewater treatment facilities.²

In continuing '208' planning efforts, new '201' treatment facility projects will be required to conform with adopted '208' areawide plans.³ This relationship between the '201' and '208' Programs will facilitate the use of '208' plans as a means for initial floodplain development impact identification. It is not expected, however, that continuing '208' planning will be conducted in all metropolitan areas and states. The '208' Program, then, cannot be relied upon to provide uniform floodplain impact identification, although it can provide assistance when continuing '208' planning occurs.

The recommended approach to the identification of potential floodplain development pressures is based upon the premise that only selected environmental impacts can be examined in detail during the Step 1 facility planning process. It also is based upon the premise that local communities and consulting engineers will focus their efforts on engineering and cost aspects of facility planning unless specific EPA requirements encourage particular environmental studies.

At present, the responsibility for identifying the particular environmental factors to be examined in detail rests with local communities and consulting engineers. A shifting of part of this responsibility to Regional Offices of the U.S. Environmental Protection Agency is expected to result in more effective environmental impact identification and mitigation.

It is not intended that this preliminary and early identification of the potential for floodplain development impacts be a replacement for environmental appraisals or environmental impact statements. Instead, it is intended to provide an "early warning" of potential floodplain impacts so that they can be thoroughly addressed during the Step 1 facility planning process.

² Interview with Mr. James Meek and Mr. Carl Myers, Program Development Branch, Water Planning Division, U.S. Environmental Protection Agency, Washington, D.C., November 8, 1977.

³ Telephone interview with Ms. Merna Hurd, Director of Water Planning Division, Office of Water Planning and Standards, U.S. Environmental Protection Agency, Washington, D.C., May 15, 1978.

2. Coordination Between the U.S. Environmental Protection Agency and the Federal Insurance Administration

Recognizing that the Federal Insurance Administration's National Flood Insurance Program is providing a major source of floodplain information and floodplain management approaches to local governments throughout the United States and resulting in the prevention of some floodplain development, additional coordination between the '201' Program and the National Floodplain Insurance Program is recommended. Although some EPA Regional Offices presently contact FIA offices on a regular basis, a uniform approach for all offices is not in effect.

The purpose of the coordination should be two-fold. First, communication and coordination are needed in order to provide EPA project engineers with basic information about floodplain hazards, issues, and the National Flood Insurance Program. The emphasis in the communication should be on the nature of the floodplain, development problems encountered, local government regulatory approaches, and requirements.

Second, it is important that FIA staff be familiar with EPA floodplain impact policies and approaches. It is possible that through their contacts with local communities, FIA staff can alert persons to EPA policies and hence initiate early community planning for wastewater treatment facilities which are compatible with floodplain development.

Recommendations:

In order to facilitate the EPA-FIA coordination and information exchange, it is recommended that each EPA Regional Office designate an environmental specialist to be responsible for floodplain coordination and information dissemination. The person assigned this responsibility should assume a leadership role, in addition to passing on information about new requirements or regulations which are received from FIA. Although persons are assigned to coordinate with FIA in some EPA Regional Offices, according to EPA and FIA officials, a formalized procedure is not in effect.

The designated EPA floodplains contact in each Regional Office would become thoroughly familiar with information available from the FIA offices, and could complete the review of '201' program priority lists, as previously recommended. In addition, the floodplains coordinator would prepare information packages for '201' program engineers, organize workshops, and assist with facility plan reviews when floodplain impacts are in question. The floodplains coordinator would also monitor EPA decisions related to floodplains and help to insure the evolution of uniform standards and criteria among different EPA program offices within each region.

3. Federal Agency Coordination for Floodplain Impact Mitigation

As illustrated by the floodplain development case studies, there is no typical pattern or sequence in which federal programs occur in local jurisdictions. The sequence of federal programs reflects the changing characteristics of federal programs available to local communities. Each community applies for those programs which meet its needs at particular times.

Despite variations in the pattern and sequence of federal programs, federal programs which can allow or stimulate floodplain development (such as the Federal-Aid to Highways Program of the U.S. Department of Transportation, Public Works Programs of the U.S. Army Corps of Engineers, and the '201' Wastewater Treatment Works Program of the U.S. Environmental Protection Agency) sometimes do occur in the same location at the same time. In such cases, it is important that the federal agencies take similar approaches to floodplain development issues. Often several federal programs together can have a more significant effect on reducing floodplain development pressures than a single agency alone can accomplish. This is especially the case when both highways and sewer lines are involved.

Recommendations:

Because of the varying pattern of federal programs in floodplains, a step-by-step procedure for interagency coordination cannot be outlined. Instead, the U.S. Environmental Protection Agency must be alert for opportunities for inter-agency coordination.

Local agencies and engineers completing '201' Facility Plans are cognizant of plans and proposals of various federal agencies. Information about other federal programs occurring in or near the floodplain and the wastewater treatment facility should be requested in those communities where potential floodplain development pressures have been identified (as recommended previously). Information concerning federal programs occurring near the wastewater treatment facility and the service area should be included in the '201' Facility Plan.

If the Step 1 Facility Plan review results in the identification of potentially significant floodplain development pressures and if other federal programs are planned for or occurring in or near the floodplain, inter-agency contacts or meetings should be initiated by the EPA Regional Office. The agencies should review community conditions and the potential impact of all federal programs on floodplain development pressures, and then determine a uniform course of action. A single federal agency policy on floodplain development in the particular community, rather than separate agency policies, should result. In some cases, technical assistance in developing appropriate approaches to floodplain impacts and development from the Regional Offices of the Federal Insurance Administration may be useful.

The responsibility for initiating inter-agency coordination actions rests with the Regional Offices. Formal procedures, such as inter-agency memoranda or agreements are not necessary to facilitate the coordination.

In order to carry out this recommendation, Regional Office personnel must understand and believe in the policy of EPA and the Floodplains Management Executive Order. The mitigation of floodplain development impacts from federal programs is a federal agency responsibility. Although such mitigation should not be expected to control all floodplain development, it can be a critical factor in certain instances.

4. Use of Grant Conditions for Sewer Hookup Restrictions

When it has been determined that a treatment facility is

likely to have a significant impact on floodplain development, there are a number of different actions which can be taken to mitigate the impact. Mitigation measures which have proven useful include project revisions, reduction of the service area of the treatment facility, phasing of treatment facilities, and the use of grant conditions. Grant conditions which restrict sewer hookups are often attached to Step 2 and Step 3 grants, after the Step 1 Facility Plan has been completed and reviewed by the Regional Office.

All of these floodplain impact mitigation measures can be useful in particular situations. In order to avoid delays in facility planning and construction, the need for particular mitigation measures should be identified during the Step 1 facility planning stage and used to develop the Step 1 Facility Plan. As documented in previous studies of the Environmental Protection Agency as well as this study, however, the potential for floodplain development impacts often is not identified until after the Step 1 Facility Plan has been completed. Often it is through the environmental appraisal or an environmental impact statement that floodplain impacts are described. At this point, redesign of the facility or additional cost-effectiveness studies may not be possible. Grant conditioning is the mitigation measure most appropriate for situations where additional facility studies are not possible. Since this is a common occurrence, the use of grant conditions for sewer hookup restrictions is emphasized in this section.

As noted in several places in this report, the legal and administrative effectiveness of using grant conditions for sewer hookup restrictions is questioned by certain EPA Regional Office personnel. The issue can be simply stated as follows: after a facility grant has been received by the local sponsor and final construction approved by EPA, what leverage does EPA have to insure that the grantee follows the hookup restrictions included in the grant?

The Office of General Counsel in the central EPA office in Washington, D.C. has researched the problem of the

"enforceability" of grant conditions. It is the finding of the Office of General Counsel that there are legal remedies if grant conditions for a construction grants project are violated, either before or after completion of the project.⁴ If contract provisions are violated after the final grant payment by EPA, the federal government has standing and may go to the U.S. District Court to enjoin the local agency from violating contract conditions. There is court precedent to support this approach.

There are, of course, certain practical considerations. Court cases involve time, resources, and the overall value of the effort must be weighed before litigation is initiated. There is no question, however, about the availability of court action to enforce the conditions.

The legal basis for injunctions would be clarified if construction grants project contracts include statements to the effect that such grant conditions apply to the life of the facility. It is recommended that the Washington Office of EPA draft appropriate language for grant conditions and make it available to Regional Offices for use with '201' construction grants.

It is, therefore, recommended that grant conditions be used for sewer hookup restrictions in those instances where scaling down of the treatment facility project, relocation of the interceptor and plant, and other mitigation measures are not possible. It is further recommended that Washington offices of the U.S. Environmental Protection Agency prepare a package of information about grant restrictions for sewer hookups, including suggested language and the experience of Regional Offices in using hookup restrictions, for the use of project engineers and administrators in Regional Offices.

5. Definition of Criteria and Standards for Floodplain Development Impacts

Although the Floodplains Management Executive Order and EPA policies clearly state the need to avoid floodplain development whenever possible, the fact remains that, in some cases, floodplain development pressures cannot be avoided.

⁴ Information from Mr. Gerald Yamada, Attorney, Grants, Contracts and General Administration Division, Office of General Counsel, U.S. Environmental Protection Agency, May 16, 1978.

In cases where floodplain development impacts cannot be avoided, it may be possible to reduce hazardous conditions and adverse environmental impacts by following certain criteria and standards for development. In addition, it may be possible for federal programs to encourage development to occur in locations where adverse impacts from floodplain development are minimized. It is important that EPA work toward the development of useful criteria and standards for reducing impacts when floodplain development is necessary or inevitable.

Recommendations:

Criteria and standards related to floodplain development will vary with different types of floodplains. The focus for the development of such standards should, therefore, be with Regional Offices of EPA. Coordination among the regions can then be undertaken by the Washington, D.C. EPA headquarters.

It is recommended that each EPA Regional Office work toward the development of useful criteria and standards for reduction of floodplain impacts in those cases where some floodplain development must take place. Logically, the development of such criteria would be the responsibility of a floodplain coordinator who would monitor EPA decisions on floodplain development impacts and work closely with the Federal Insurance Administration to identify '201' projects which are potential floodplain problems.

The development of criteria and standards is a much needed element of effective implementation of EPA's floodplains protection policies. Although the task is a difficult one, it should result in a clarification of EPA policies as well as better floodplain protection.